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Title

Image processing apparatus and database

Preliminary Class

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CLAIMS

1. Apparatus for archiving data defining models of three-dimensional objects, comprising:

5 a data receiver for receiving data defining movements of the three-dimensional objects;

a first archive data generator for generating first archive data defining where at least one object is looking; and

10 a database for storing the first archive data such that it is associated with archive data for the three-dimensional objects.

2. Apparatus according to claim 1, wherein the first archive data generator is arranged to generate first archive data defining a person, animal or object at which the at least one object is looking.

3. Apparatus according to claim 1, wherein the database is arranged to store archive data for the three-dimensional objects comprising data defining the movements thereof.

4. Apparatus according to claim 1, wherein the database is arranged to store archive data for the three-

dimensional objects comprising data defining the three-dimensional objects in different positions.

5. Apparatus according to claim 1, wherein the first archive data generator is arranged to generate respective first archive data for data received at different times by the receiving means, and the database is arranged to store the first archive data associated with the corresponding archive data for the three-dimensional objects and associated with second archive data comprising timing data.

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15. Apparatus according to claim 1, further comprising a third archive data generator for generating third archive data defining text corresponding to words spoken by one of the three-dimensional objects, and wherein the database is arranged to store the third archive data such that it is associated with the archive data for the three-dimensional objects and related archive data.

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25. Apparatus according to claim 6, wherein the third archive data generator comprises an audio receiver for receiving audio data and an audio data processor for processing the audio data to generate the text data therefrom.

8. Apparatus according to claim 1, wherein the data receiver means is further arranged to receive audio data, and wherein the database is arranged to store the audio data such that it is associated with the archive data for the three-dimensional objects and related archive data.

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9. Apparatus according to claim 1, wherein the database is arranged to store the archive data for the three-dimensional objects as MPEG 4 data.

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10. Apparatus according to claim 8, wherein the database is arranged to store the archive data for the three-dimensional objects and the audio data as MPEG 4 data.

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11. Apparatus according to claim 1, further comprising a fourth archive data generator for generating fourth archive data defining, for a predetermined period, the proportion of time spent by a given three-dimensional object looking at each of other three-dimensional objects during the predetermined period, and wherein the database is arranged to store the fourth archive data such that it is associated with the archive data for the three-dimensional objects and related archive data.

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25 12. Apparatus according to claim 11, wherein the

predetermined period comprises a period during which the given three-dimensional object was talking.

13. Apparatus according to claim 1, further comprising
5 a movement data generator for processing image data from at least one camera to generate data defining movements of the three-dimensional objects.

14. Apparatus according to claim 1, further comprising:
10 a store for storing data defining three-dimensional models of the objects; and

15 a model data processor for changing the data in the store to give amended model data in dependence upon the data received by the data receiver defining movements of the objects;

and wherein the database is arranged to store the amended model data as the archive data for the three-dimensional objects.

20 15. Apparatus according to claim 1, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the
25 search instructions.

16. Apparatus according to claim 15, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the first archive data.

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17. Apparatus according to claim 5, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the search instructions, and wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first or second archive data.

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18. Apparatus according to claim 6, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each part of the archive data for the three-dimensional objects which meets criteria defined in the search instructions, and wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first or third archive data.

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19. Apparatus according to claim 11 further comprising
a database searcher for searching data stored in the
database in accordance with search instructions to
identify each part of the archive for three-dimensional
5 objects which meets criteria defined in the search
instructions, and wherein the database searcher is
operable to search data stored in the database in
accordance with search criteria relating to any one or
more of the first or fourth archive data.

10

20. Apparatus according to claim 1, further comprising
a renderer for rendering a model of the three-dimensional
objects to generate image data showing the movements of
the objects.

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21. Apparatus for generating data for archiving data
defining models of three-dimensional objects, comprising:
a receiver for receiving data defining movements of
the three-dimensional objects; and

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a first archive data generator for generating first
archive data defining where at least one object is
looking.

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22. Apparatus for searching data stored in a database
comprising data for three-dimensional objects and first

archive data defining where the objects are looking, the apparatus comprising a receiver for receiving data defining search criteria relating to the first archive data, and a database searcher for searching the data in
5 the database in accordance with the search criteria.

23. Apparatus for archiving virtual meeting data, comprising:

10 a store for storing data defining a three-dimensional model of participants in the meeting;
a receiver for receiving data defining movements of
the participants;
an archive data generator for generating archive
data defining where each person is looking; and
15 a database for storing the archive data linked to
data defining the movements of the participants.

24. Apparatus for archiving virtual meeting data, comprising:

20 a store for storing data defining a three-dimensional model of the participants in the meeting;
a receiver for receiving data defining movements of
the participants;
an archive data generator for generating archive
data defining where each person is looking; and
25

a database for storing the archive data linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

5 25. A method of archiving data defining models of three-dimensional objects, comprising:

receiving data defining movements of the three-dimensional objects;

10 generating first archive data defining where at least one object is looking; and

storing the first archive data in a database such that it is associated with archive data for the three-dimensional objects.

15 26. A method of generating data for archiving data defining models of three-dimensional objects, comprising:

receiving data defining movements of the three-dimensional objects; and

20 generating first archive data defining where at least one object is looking.

25 27. A method of searching data stored in a database comprising data for three-dimensional objects and first archive data defining where the objects are looking, comprising receiving data defining search criteria.

relating to the first archive data and searching the data in the database in accordance with the search criteria.

28. A method of archiving virtual meeting data,
5 comprising:

storing data defining a three-dimensional model of participants in the meeting;

receiving data defining movements of the participants;

10 generating archive data defining where each person is looking; and

storing the archive data in a database linked to data defining the movements of the participants.

15 29. A method of archiving virtual meeting data,
comprising:

storing data defining a three-dimensional model of the participants in the meeting;

20 receiving data defining movements of the participants;

generating archive data defining where each person is looking; and

25 storing the archive data in a database linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

30. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 1, 21, 22, 23 and 24.

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31. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 25, 26, 27, 28 and 29.

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32. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 1, 21, 22, 23 and 24.

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33. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 25, 26, 27, 28 and 29.

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34. Apparatus for archiving data defining models of three-dimensional objects, comprising:

receiving means for receiving data defining movements of the three-dimensional objects;

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means for generating first archive data defining

where at least one object is looking; and
a database for storing the first archive data such
that it is associated with archive data for the three-
dimensional objects.

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35. Apparatus for generating data for archiving data
defining models of three-dimensional objects, comprising:
receiving means for receiving data defining
movements of the three-dimensional objects; and
means for generating first archive data defining
where at least one object is looking.

36. Apparatus for searching data stored in a database
comprising data for three-dimensional objects and first
archive data defining where the objects are looking, the
apparatus comprising means for receiving data defining
search criteria relating to the first archive data, and
means for searching the data in the database in
accordance with the search criteria.

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37. Apparatus for archiving virtual meeting data,
comprising:
storage means for storing data defining a three-
dimensional model of participants in the meeting;
means for receiving data defining movements of the

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participants;

means for generating archive data defining where each person is looking; and

5 database means for storing the archive data linked to data defining the movements of the participants.

38. Apparatus for archiving virtual meeting data, comprising:

10 storage means for storing data defining a three-dimensional model of the participants in the meeting;

means for receiving data defining movements of the participants;

means for generating archive data defining where each person is looking; and

15 database means for storing the archive data linked to data defining the three-dimensional model amended in accordance with the data defining the movements.

39. Apparatus for creating a two-dimensional (2D) moving image database, comprising:

20 an image data receiver for receiving 2D moving image data;

a participant identifier for identifying participants shown in the moving image data;

25 a gaze direction data provider for providing data

relating to the direction of gaze of participants in the moving image data;

a memory for storing the database; and

5 a database generator for generating in the memory a database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a participants data file storing data representing the identified participants, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of moving image data stored in the corresponding image data storage area.

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40. Apparatus according to claim 39, wherein the database generator is arranged to generate the database so as to provide a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each storing gaze data for the associated participant for the section of moving image data stored

20 in the corresponding image data storage area.

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41. Apparatus according to claim 39, further comprising
an audio data receiver for receiving audio data
corresponding to 2D moving image data, wherein the
database generator is arranged to generate the database
such that the database also comprises an audio file
having a plurality of audio data storage areas each
associated with a respective different one of the image
data storage areas with each audio data storage area
storing data relating to audio data associated with the
section of the moving image data stored in the
corresponding image data storage area.

42. Apparatus according to claim 39, further comprising
an audio data receiver for receiving audio data
corresponding to the 2D moving image data, wherein the
database generator is operable to generate the database
such that the database also comprises a plurality of
audio files each associated with a respective different
participant and each having a plurality of audio data
storage areas each associated with a respective different
one of the image data storage areas and each audio data
storage area storing data relating to audio data
associated with the corresponding image data storage
area.

43. Apparatus according to claim 39, further comprising
a speech data receiver for receiving speech data
corresponding to the 2D moving image data, the database
generator being operable to generate the database such
5 that the database also comprises a speech file having a
plurality of speech data storage areas each associated
with a respective different one of the image data storage
areas with each speech data storage area being arranged
to store data relating to words spoken by or associated
10 with a participant in image data stored in the
corresponding image data storage area.

44. Apparatus according to claim 39, further comprising
a speech data receiver for receiving speech data
corresponding to the 2D moving image data, the database
generator being operable to generate the database such
15 that the database also comprises a plurality of speech
files each associated with a different participant and
each speech file having plurality of speech data storage
areas each associated with a respective different one of
the image data storage areas and storing data relating to
20 words spoken by or associated with that participant in
relation to image data stored in that image data storage
area.

45. Apparatus according to claim 39, further comprising
a speech data receiver for receiving speech data
corresponding to the 2D moving image data, the database
generator being operable to generate the database such
that the database also comprises a speech file having a
plurality of speech data storage areas each associated
with a respective different one of the image data storage
areas with each speech data storage area storing data
relating to words spoken by or associated with a
participant in image data stored in the corresponding
image data storage area, the database generator also
being operable to generate the viewing data file such
that each viewing data storage area stores data
indicating which, if any, of other participants in an
item of image data stored in the corresponding image data
storage area is being gazed or looked at by the
participant when the participant associated with the
viewing data file is speaking.

46. Apparatus according to claim 45, wherein the
database generator is operable to generate a viewing data
file for each of a plurality of participants shown in the
moving image data such that each viewing data storage
area of each viewing data file stores data indicating
which, if any, of other participants in an item of image

data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

5 47. Apparatus according to claim 43, wherein the speech data receiver further comprises a converter for converting the audio speech data to text.

10 48. Apparatus according to claim 47, wherein the converter comprises a speech recognition data file, a speech processor for using the speech recognition data file to identify phonemes in the received audio speech data, a recognition processor for recognising words in the speech data and a writer for storing both the identified phonemes and text representing the identified words in the speech data files.

15 49. Apparatus according to claim 43, wherein the speech data receiver further comprises a transcript retriever for accessing a transcript of speeches occurring in the moving image data, an identifier for identifying speeches by different participants in the transcript and a writer for storing each identified speech in the speech file of the participant responsible for that speech such that 20 each speech data storage area of that speech contains the

portion of the transcript associated with the image data stored in the corresponding image data storage area.

5. 50. Apparatus according to claim 43, further comprising a histogram generator for using the speech and gaze data to generate for each speech a viewing histogram indicating the amount of time the speaker looked at each of the other participants during that speech, the database generator being operable to generate in the database a respective viewing histogram file for each participant and to store the generated viewing histograms in the viewing histogram file such that each viewing histogram is associated with the speech data storage areas where the corresponding speech is stored.

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51. Apparatus according to claim 39, wherein the participant identifier comprises a display generator for displaying a section of the moving image data to a user, an input device for enabling input to the database generator by the user of data identifying the participants and an input data reader for reading the data input by the user.

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52. Apparatus according to claim 39, wherein the gaze direction data provider comprises a display generator for

displaying the moving image data to a user, an input device for enabling the user to enter to the database generator the direction of gaze of the participants in the displayed image data and an input data reader for reading the data entered by the user.

5 53. Apparatus according to claim 39, wherein the image data receiver is arranged to receive video data.

10 54. Apparatus according to claim 53, further comprising a data compressor for causing the 2D moving image data to be stored in a compressed format in the image data file.

15 55. Apparatus according to claim 54, wherein the data compressor is arranged to store the 2D moving image data in MPEG format.

56. A method of creating a two-dimensional (2D) moving image database, comprising:

20 receiving 2D moving image data;
identifying participants shown in the moving image data;
providing data relating to the direction of gaze of participants in the moving image data; and
25 using a processor to generate in a memory a

database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a participants data file storing the identified participants, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of moving image data stored in the corresponding image data storage area.

5 57. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the apparatus comprising:
10
15 an image data receiver for receiving 2D moving image data;
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a participant identifier for identifying participants shown in the moving image data; and

5 a gaze direction data provider for providing data relating to the direction of gaze of participants in the moving image data.

10 58. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image data stored in the corresponding image data storage area,

15 20 the apparatus comprising:

an image data receiver for receiving 2D moving image data;

25 a participant identifier for identifying participants shown in the moving image data; and

a gaze direction data provider for providing data relating to the direction of gaze of participants in the moving image data.

5 59. Apparatus according to claim 58 for providing 2D
moving image data for storage in a database structure
which also comprises an audio file having a plurality of
audio data storage areas each associated with a
respective different one of the image data storage areas
10 with each audio data storage area arranged to store data
relating to audio data associated with the section of the
moving image data stored in the corresponding image data
storage area, the apparatus further comprising an audio
data receiver for receiving audio data corresponding to
15 2D moving image data.

60. Apparatus according to claim 58, for providing 2D
moving image data for storage in a database structure
which also comprises a plurality of audio files each
20 associated with a respective different participant and
each having a plurality of audio data storage areas each
associated with a respective different one of the image
data storage areas and each audio data storage area being
arranged to store data relating to audio data associated
25 with the corresponding image data storage area, the

apparatus further comprising an audio data receiver for receiving audio data corresponding to the 2D moving image data.

5 61. Apparatus according to claim 58, for providing 2D
moving image data for storage in a database structure
which also comprises a speech file having a plurality of
speech data storage areas each associated with a
respective different one of the image data storage areas
10 with each speech data storage area being arranged to
store data relating to words spoken by or associated with
a participant in image data stored in the corresponding
image data storage area, the apparatus further comprising
a speech data receiver for receiving speech data
15 corresponding to the 2D moving image data.

62. Apparatus according to claim 58, for providing 2D
moving image data for storage in a database structure
which also comprises a plurality of speech files each
20 associated with a different participant and each speech
file having plurality of speech data storage areas each
associated with a respective different one of the image
data storage areas and each arranged to store data
relating to words spoken by or associated with that
25 participant in relation to image data stored in that

image data storage area, the apparatus comprising a speech data receiver for receiving speech data corresponding to the 2D moving image data.

5 63. Apparatus according to claim 57, for providing 2D
moving image data for storage in a database structure
which also comprises a speech file having a plurality of
speech data storage areas each associated with a
respective different one of the image data storage areas
10 with each speech data storage area being arranged to
store data relating to words spoken by or associated with
a participant in image data stored in the corresponding
image data storage area, and in which each viewing data
storage area is arranged to store data indicating which,
15 if any, of other participants in an item of image data
stored in the corresponding image data storage area is
being gazed or looked at by the participant when the
participant associated with the viewing data file is
speaking, the apparatus further comprising a speech data
20 receiver for receiving speech data corresponding to the
2D moving image data.

25 64. Apparatus according to claim 63, for providing 2D
moving image data for storage in a database structure
which includes a viewing data file for each of a

plurality of participants shown in the moving image data such that each viewing data storage area of each viewing data file is arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

5 65. Apparatus according to claims 61, wherein the speech
10 data receiver comprises a converter for converting audio speech data to text.

15 66. Apparatus according to claim 65, wherein the converter comprises a speech recognition data file, a speech processor for using the speech recognition data file to identify phonemes in the received audio speech data, a word recogniser for recognising words in the speech data and a writer for causing both the identified phonemes and text representing the identified words to be
20 stored in the speech data files.

25 67. Apparatus according to claim 61, wherein the speech data receiver comprises a transcript retriever for accessing a transcript of speeches occurring in the moving image data, an identifier for identifying speeches

by different participants in the transcript and a writer
for causing each identified speech to be stored in the
speech file of the participant responsible for that
speech such that each speech data storage area of that
speech contains the portion of the transcript associated
with the image data stored in the corresponding image
data storage area.

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104. Apparatus according to claim 61, further comprising
a histogram generator for using the speech and gaze data
to generate for each speech a viewing histogram
indicating the amount of time the speaker looked at each
of the other participants during that speech for storage
in a respective viewing histogram file in the database
such that each viewing histogram is associated with the
speech data storage areas where the corresponding speech
is stored.

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105. Apparatus according to claim 57, wherein the
participant identifier comprises a display generator for
displaying a section of the moving image data to a user,
an input device for enabling input to the database
generator by the user of data identifying the
participants and an input data reader for reading the
data input by the user.

70. Apparatus according to claim 57, wherein the gaze direction data provider comprises a display generator for displaying the moving image data to a user, an input device for enabling the user to enter to the database generator the direction of gaze of the participants in the displayed image data and an input data reader for reading the data entered by the user.

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71. Apparatus according to claim 57, wherein the image data receiver is arranged to receive video data.

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72. Apparatus according to claim 71, further comprising a data compressor for causing the 2D moving image data to be stored in a compressed format in the image data file.

15

73. Apparatus according to claim 72, wherein the data compressor is arranged to store the 2D moving image data in MPEG format.

20

74. A method of providing a two-dimensional (2D) moving image for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store

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participants data, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the method comprising:

- 5 receiving 2D moving image data;
- identifying participants shown in the moving image data; and
- 10 providing data relating to the direction of gaze of participants in the moving image data.

75. A method of providing a two-dimensional (2D) moving image for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image

data stored in the corresponding image data storage area,
the method comprising:

receiving 2D moving image data;

identifying participants shown in the moving image
data; and

providing data relating to the direction of gaze of
participants in the moving image data.

76. Apparatus for searching a database generated by
10 using apparatus in accordance with claim 39, comprising:

a search parameter receiver for receiving a first
search parameter identifying a first participant and a
second search parameter identifying a second participant
at which the first participant is looking;

15 a data file identifier for identifying in the
database a viewing data file associated with the first
participant;

20 a viewing data storage area identifier for
identifying within the identified viewing data file any
viewing data storage area storing data associating the
second participant with the first participant;

an image data storage area identifier for
identifying an image data storage area associated with an
identified viewing data storage area; and

25 a data supplier for supplying to a user details

identifying the identified image data storage area.

77. Apparatus according to claim 76, for searching a database, wherein the search parameter receiver is
5 arranged for receiving a further search parameter defining text spoken by the first participant to the second participant, wherein the apparatus further comprises a speech data storage area identifier means for identifying within the speech file associated with the first participant any speech data storage area containing that speech, and wherein the image data storage area identifier is further arranged for identifying an image data storage area corresponding to an identified speech data storage area.
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15 78. Apparatus according to claim 77, which further comprises a viewing proportion file checker for checking the viewing proportion file for the first participant for the identified speech and for disregarding any identified speeches where the amount of time the first participant looks at the second participant is less than a predetermined proportion of the duration of that speech.
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25 79. A method of searching a database in accordance with claim 56, comprising receiving a first search parameter

identifying a first participant and a second search parameter identifying a second participant at which the first participant is looking; identifying in the database a viewing data file associated with the first participant; identifying within the identified viewing data file any viewing data storage area storing data associating the second participant with the first participant; identifying an image data storage area associated with an identified viewing data storage area; and supplying to a user details identifying the identified image data storage area.

80. A signal carrying processor implementable
instructions for controlling a processor to carry out the
steps as claimed in the method of at least one of claims
15 56, 74, 75 and 79.

81. A storage medium storing processor implementable
instructions for controlling a processor to carry out the
steps as claimed in the method of at least one of claims
56, 74, 75 and 79.

82. Apparatus for creating a two-dimensional (2D) moving image database, comprising:

means for identifying participants shown in the moving image data;

means for providing data relating to the direction of gaze of participants in the moving image data;

5 memory means for storing the database; and

processing means for generating in the memory a database, comprising: an image data file having a plurality of image data storage areas each storing a respective different section of the moving image data, a 10 participants data file storing data representing the identified participants, and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and each storing gaze data for the section of 15 moving image data stored in the corresponding image data storage area.

83. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a viewing data file having a 20 plurality of viewing data storage areas each associated 25

with a respective different one of the image data storage areas and each arranged to store gaze data for the section of moving image data stored in the corresponding image data storage area, the apparatus comprising:

- 5 means for receiving 2D moving image data;
- means for identifying participants shown in the moving image data; and
- means for providing data relating to the direction of gaze of participants in the moving image data.

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84. Apparatus for providing two-dimensional (2D) moving image data for storage in a database having a database structure comprising an image data file having a plurality of image data storage areas each arranged to store a respective different section of the moving image data, a participants data file arranged to store participants data, and a plurality of viewing data files each associated with a particular different one of participants shown in the moving image data and each having a plurality of viewing data storage areas each associated with a respective different image data storage area and each arranged to store gaze data for the associated participant for the section of moving image data stored in the corresponding image data storage area,
- 15 the apparatus comprising:
- 20
- 25

means for receiving 2D moving image data;
means for identifying participants shown in the
moving image data; and
means for providing data relating to the direction
of gaze of participants in the moving image data.

5 85. Apparatus for searching a database generated by
using apparatus in accordance with claim 39, comprising:

10 means for receiving a first search parameter
identifying a first participant and a second search
parameter identifying a second participant at which the
first participant is looking;

15 means for identifying in the database a viewing data
file associated with the first participant;

20 means for identifying within the identified viewing
data file any viewing data storage area storing data
associating the second participant with the first
participant;

means for identifying an image data storage area
associated with an identified viewing data storage area;
and

25 means for supplying to a user details identifying
the identified image data storage area.

25 86. Apparatus for archiving still image data,

comprising:

an image data receiver for receiving image data defining an input image;

5 a first archive data generator for generating first archive data defining a person or animal in the input image;

10 a second archive data generator for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking; and

a database for storing the first and second archive data such that it is associated with image data defining the input image.

15 87. Apparatus according to claim 86, further comprising a third archive data generator for generating third archive data defining text, and wherein the database is arranged to store the third archive data such that it is associated with the first and second archive data and the stored image data defining the input image.

20 88. Apparatus according to claim 87, wherein the third archive data generator comprises an optical character recogniser for performing optical character recognition.

89. Apparatus according to claim 87, wherein the third archive data generator is operable to allow a user to input the text information manually.

5 90. Apparatus according to claim 86, further comprising a fourth archive data generator for generating fourth archive data defining information about when the input image was recorded, and wherein the database is arranged to store the fourth archive data such that it is
10 associated with the stored image data defining the input image and related archive data.

15 91. Apparatus according to claim 90, wherein the fourth archive data generator comprises a recording date reader for performing processing to read a recording date from the received image data.

20 92. Apparatus according to claim 90, wherein the fourth archive data generator is operable to allow a user to input manually the information about when the input image was recorded.

25 93. Apparatus according to claim 86, wherein the first archive data generator comprises an image recognition processor for performing image recognition processing.

94. Apparatus according to claim 86, wherein the first archive data generator is operable to allow a user to input the first archive data manually.

5 95. Apparatus according to claim 86, wherein the second archive data generator is operable to allow a user to input the second archive data manually.

10 96. Apparatus according to claim 86, further comprising a database searcher for searching data stored in the database in accordance with search instructions to identify each stored image which meets criteria defined in the search instructions.

15 97. Apparatus according to claim 96, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the second archive data.

20 98. Apparatus according to claim 97, wherein the database searcher is operable to search data stored in the database in accordance with search criteria relating to the first and second archive data.

25 99. Apparatus according to claim 96, wherein the

database searcher is operable to search data stored in the database in accordance with search criteria relating to any one or more of the first, second, third or fourth archive data.

5

100. Apparatus according to claim 86, further comprising a display for displaying an image to a user.

10

101. Apparatus for generating data for archiving still image data in a database, comprising:

an image data receiver for receiving image data defining an input image;

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a first archive data generator for generating first archive data defining a person or animal in the input image; and

a second archive data generator for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

20

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102. Apparatus for searching data stored in a database comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and second archive data defining a person, animal or object

at which the person or animal defined in the first archive data is looking, the apparatus comprising a receiver for receiving data defining search criteria, and a searcher for searching the data in the database in accordance with search criteria relating to the second archive data to identify each stored image which meets the criteria.

103. A method of archiving still image data in a computer database, comprising the steps of:

receiving image data defining an input image;
generating first archive data defining a person or animal in the input image;
generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking; and
storing the first and second archive data in the database such that it is associated with image data defining the input image.

104. A method of generating data for archiving still image data in a database, comprising:

receiving image data defining an input image;
generating first archive data defining a person or animal in the input image; and

generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

5 105. A method of searching data stored in a database comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking, the method comprising receiving data defining search criteria and searching the data in the database in accordance with search criteria relating to the second archive data to identify each stored image which meets the criteria.

10 106. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 86, 101 and 102.

20 107. A storage device storing computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 103, 104 and 105.

108. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become configured as an apparatus as set out in at least one of claims 86, 101 and 102.

5

109. A signal conveying computer-useable instructions for causing a programmable processing apparatus to become operable to perform a method as set out in at least one of claims 103, 104 and 105.

10

110. Apparatus for archiving still image data, comprising:

means for receiving image data defining an input image;

15

means for generating first archive data defining a person or animal in the input image;

means for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking; and

20

a database for storing the first and second archive data such that it is associated with image data defining the input image.

25 111. Apparatus for generating data for archiving still image data in a database, comprising:

means for receiving image data defining an input image;

means for generating first archive data defining a person or animal in the input image; and

5 means for generating second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking.

10 112. Apparatus for searching data stored in a database comprising image data defining a plurality of still images and, for each of the still images, first archive data defining a person or animal in the input image and second archive data defining a person, animal or object at which the person or animal defined in the first archive data is looking, the apparatus comprising means for receiving data defining search criteria and means for searching the data in the database in accordance with search criteria relating to the second archive data to identify each stored image which meets the criteria.

15 20 113. Apparatus for generating a database structure, comprising a memory for storing data and a processor operable to generate in the memory a database structure comprising: an image data file having a plurality of image data storage areas each arranged to store a

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respective different item of image data; a participants
data file arranged to store data identifying participants
shown in image data stored in the image data file; and a
viewing data file having a plurality of viewing data
storage areas each associated with a respective different
one of the image data storage areas and being arranged to
store data relating to the direction in which a
participant shown in an item of image data stored in the
corresponding image data storage area is looking.

10

114. Apparatus according to claim 113, wherein the
processor is operable to generate in the database
structure a plurality of viewing data files each arranged
to be associated with a particular different one of
participants shown in the image data and each having a
plurality of viewing data storage areas each associated
with a respective different image data storage area and
each being arranged to store data indicating which, if
any, of the other participants the participant associated
with that viewing data storage area is looking at in an
item of image data stored in the corresponding image data
storage area.

20

115. Apparatus according to claim 113, wherein the
participants are people.

25

116. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises an audio file having a plurality of audio data storage areas each associated with a respective different one of the image data storage areas with each audio data storage area being arranged to store data relating to audio data associated with the corresponding image data storage area.

10

117. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a plurality of audio files each arranged to be associated with a respective different participant and each having a plurality of audio data storage areas each associated with a respective different one of the image data storage areas and each audio data storage area being arranged to store data relating to audio data associated with the corresponding image data storage area.

15

118. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a speech file having a plurality of speech data storage areas each

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associated with a respective different one of the image data storage areas with each speech data storage area being arranged to store data relating to words spoken by or associated with a participant in an item of image data stored in the corresponding image data storage area.

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119. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a plurality of speech files each associated with a particular different participant and each speech file having plurality of speech data storage areas each associated with a respective different one of the image data storage areas and being arranged to store data relating to words spoken by or associated with that participant in relation to an image stored in that image data storage area.

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120. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that the database structure also comprises a speech file having a plurality of speech data storage areas each associated with a respective different one of the image data storage areas with each speech data storage area being arranged to store data relating to words spoken by

or associated with a participant in an item of image data stored in the corresponding image data storage area and to generate the viewing data file such that each viewing data storage area is arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant when the participant associated with the viewing data file is speaking.

10

121. Apparatus according to claim 120, wherein the processor is operable to generate a viewing data file for each of a plurality of participants shown in the image data with each viewing data storage area of each viewing data file being arranged to store data indicating which, if any, of other participants in an item of image data stored in the corresponding image data storage area is being looked at by the participant associated with that viewing data file when that participant is speaking.

15

122. Apparatus according to claim 118, wherein the processor is operable to generate the database structure such that the database structure also comprises at least one viewing proportion file arranged to store data relating to the amount of time an associated participant

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looks at each of a plurality of other participants while that participant is speaking.

5 123. Apparatus according to claim 118, wherein the processor is operable to generate the database structure such that the speech is arranged to be stored as text.

10 124. Apparatus according to claim 113, wherein the processor is operable to generate the database structure such that each image data storage area is arranged to store at least one frame of image data.

15 125. Apparatus according to claim 113, wherein the image data file is arranged to store image data having sound data associated therewith.

20 126. Apparatus for generating a database, comprising a memory and a processor operable to generate in the memory a database comprising: an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different

one of the image data storage areas and storing data identifying the direction in which a participant shown in the item of image data stored in the corresponding image data storage area is looking.

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127. A database structure comprising: an image data file having a plurality of image data storage areas each arranged to store a respective different item of image data; a participants data file arranged to store data identifying participants shown in image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and being arranged to store data identifying the direction in which a participant shown in the image represented by an item of image data stored in the corresponding image data storage area is looking.

128. A database comprising: an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different

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one of the image data storage areas and storing data identifying the direction in which a participant shown in the image represented by the item of image data stored in the corresponding image data storage area is looking.

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129. A signal carrying a database structure in accordance with claim 127 or a database in accordance with claim 128.

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130. A data storage medium storing a database structure in accordance with claim 127 or a database in accordance with claim 128.

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131. A method of generating a database, comprising the steps of causing a processor to generate in a memory a database comprising; an image data file having a plurality of image data storage areas each storing a respective different item of image data; a participants data file storing data identifying participants shown in the image data stored in the image data file; and a viewing data file having a plurality of viewing data storage areas each associated with a respective different one of the image data storage areas and storing data identifying the direction in which a participant shown in the image represented by the item of image data stored in

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the corresponding image data storage area is looking.

132. Apparatus for searching a database in accordance
with claim 128, comprising a receiver for receiving a
5 first search parameter identifying a first participant
and a second search parameter identifying another person
at whom the first participant is looking; a viewing data
file identifier for identifying in the database a viewing
data file associated with the first participant; a
10 viewing data storage area identifier for identifying
within the identified viewing data file any viewing data
storage area storing data associating the second
participant with the first participant; an image data
storage area identifier for identifying an image data
15 storage area associated with an identified viewing data
storage area; and a data supplier for supplying to a user
details identifying the identified image data storage
area.

20 133. A signal carrying processor implementable
instructions for controlling a processor to carry out the
steps as claimed in the method of claim 131.

25 134. A storage medium storing processor implementable
instructions for controlling a processor to carry out the

steps as claimed in the method of claim 131.

ABSTRACTIMAGE PROCESSING APPARATUS AND DATABASE

Three-dimensional computer model data, moving image data or still image data showing at least one person is stored in an archive database 126, 703, 850, 1303, together with additional information to improve the searching and retrieval of data therefrom. The additional information includes view parameter data 512, 1040 which defines at whom or what each person is looking during each predetermined period of time or image. Text data 504, 1020 which comprises words associated with the person, and viewing histogram data 540 which, for each period of text data defines the percentage of time that the speaking person spent looking at each other person or object, may also be stored.

(FIGURE 36B)

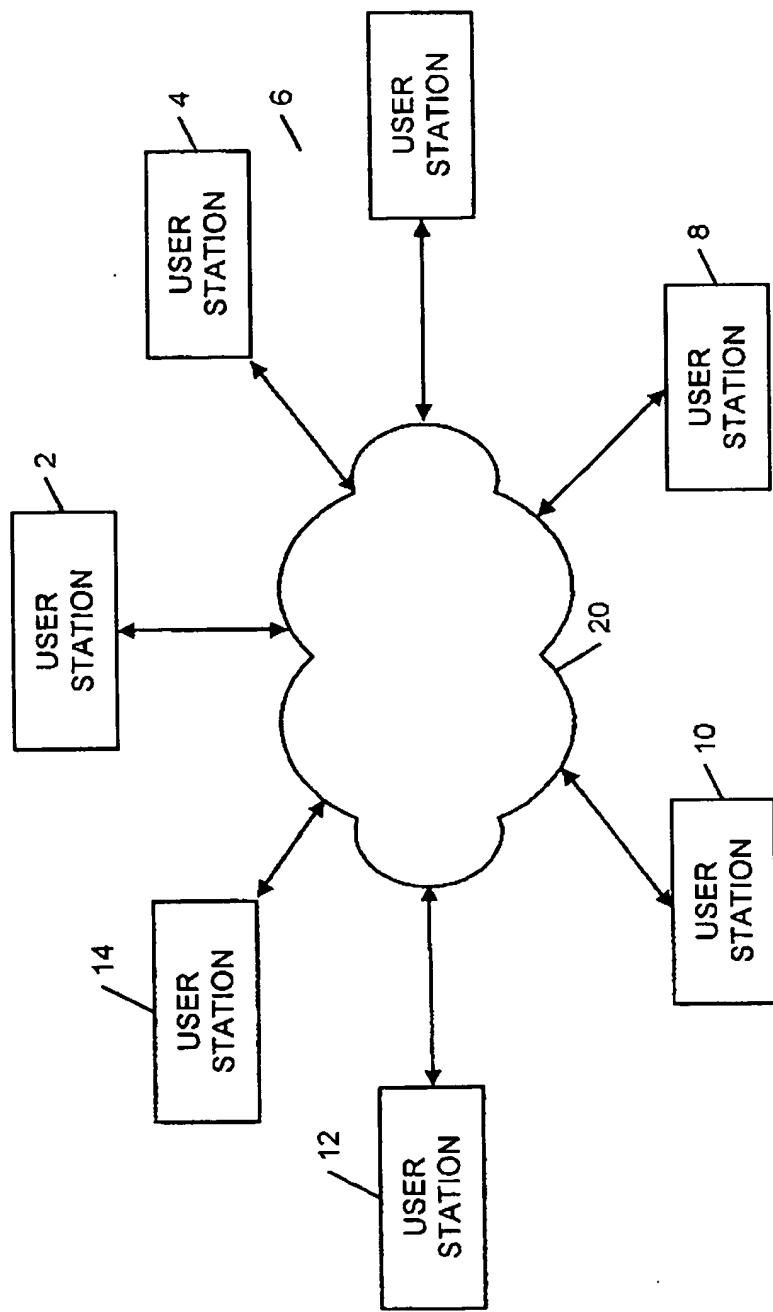
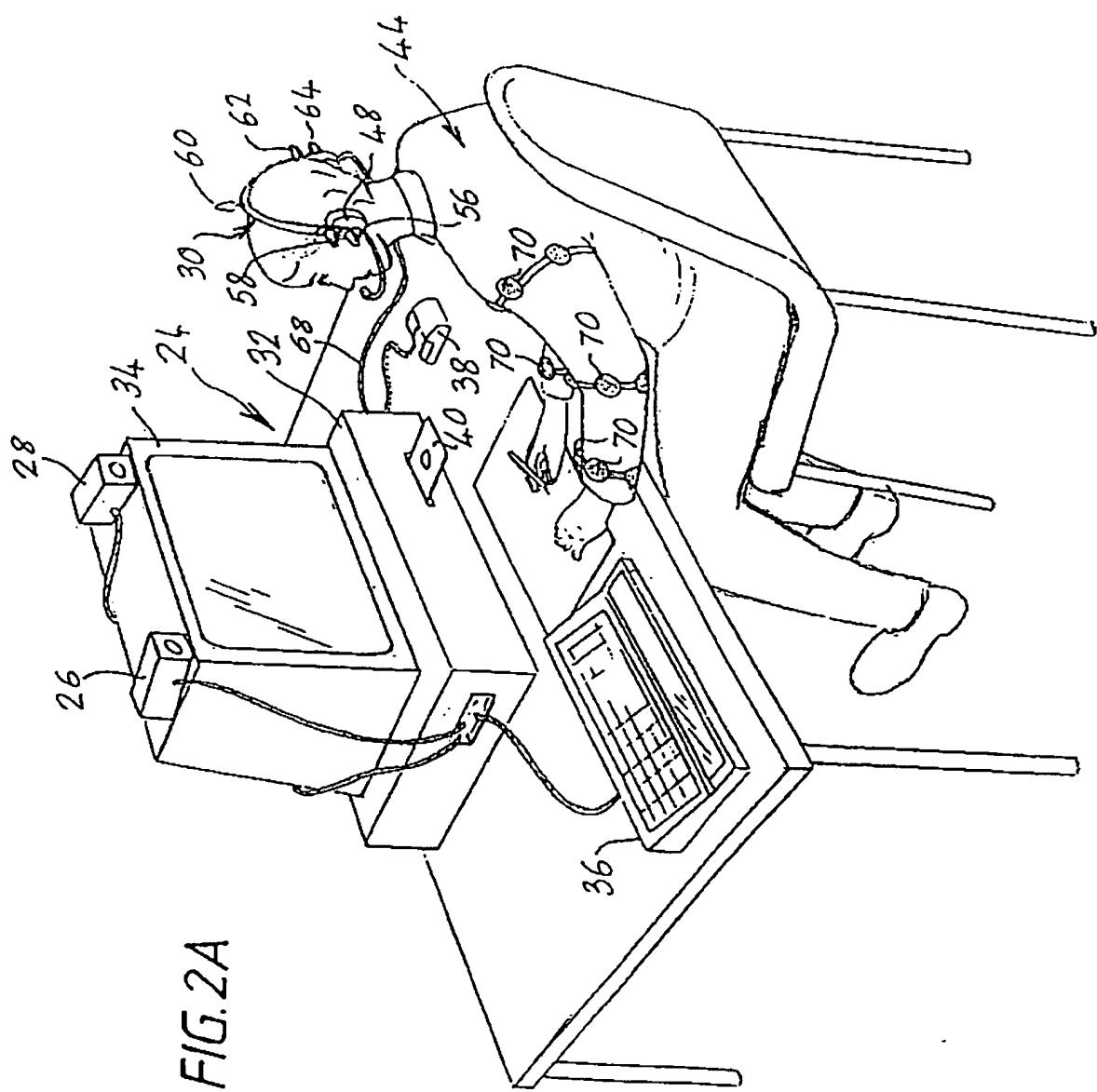


FIG. 1



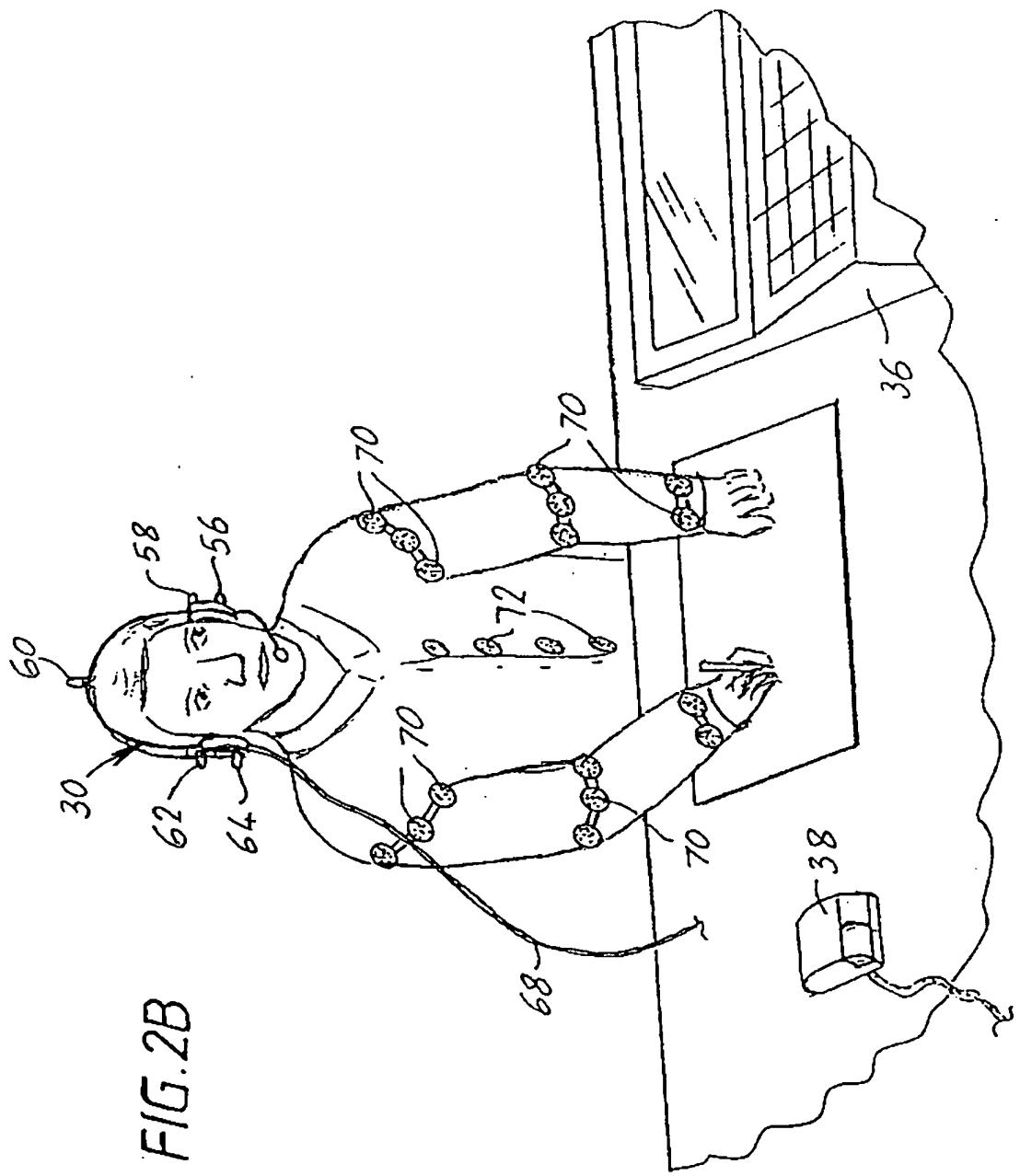


FIG. 2C

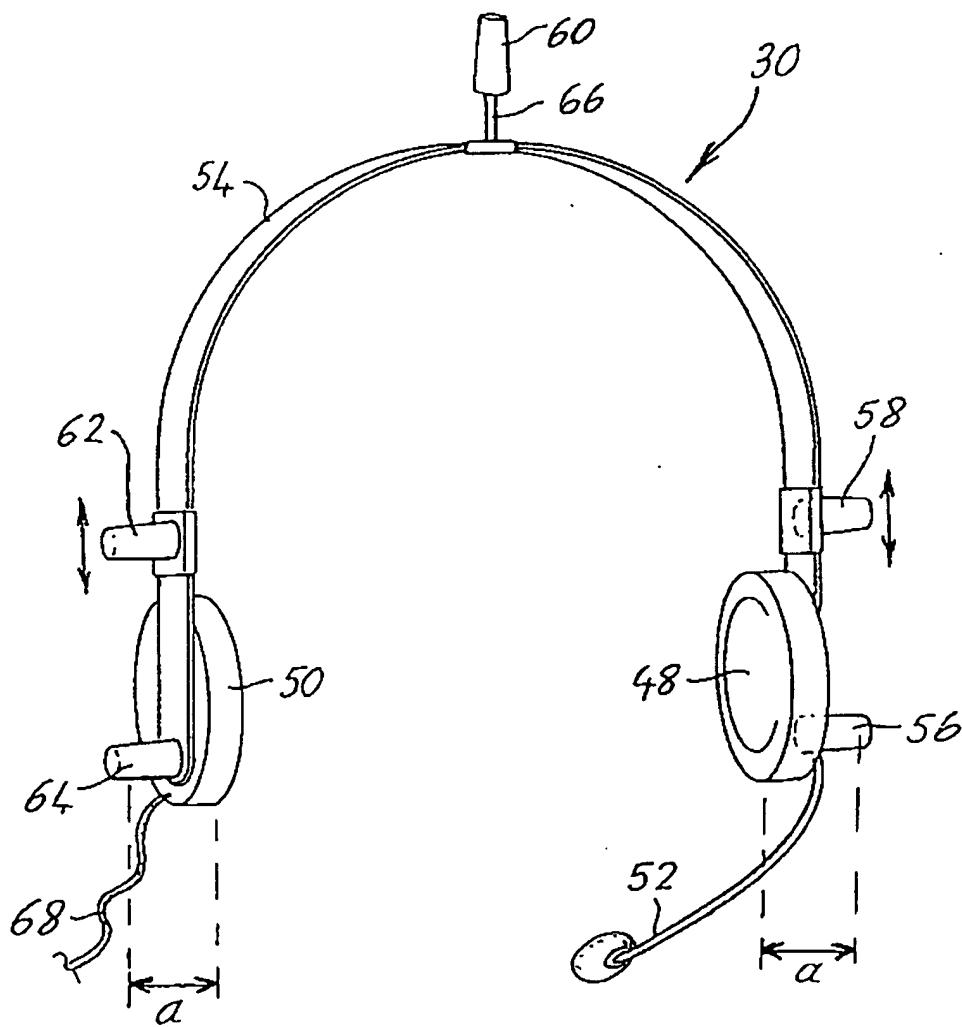
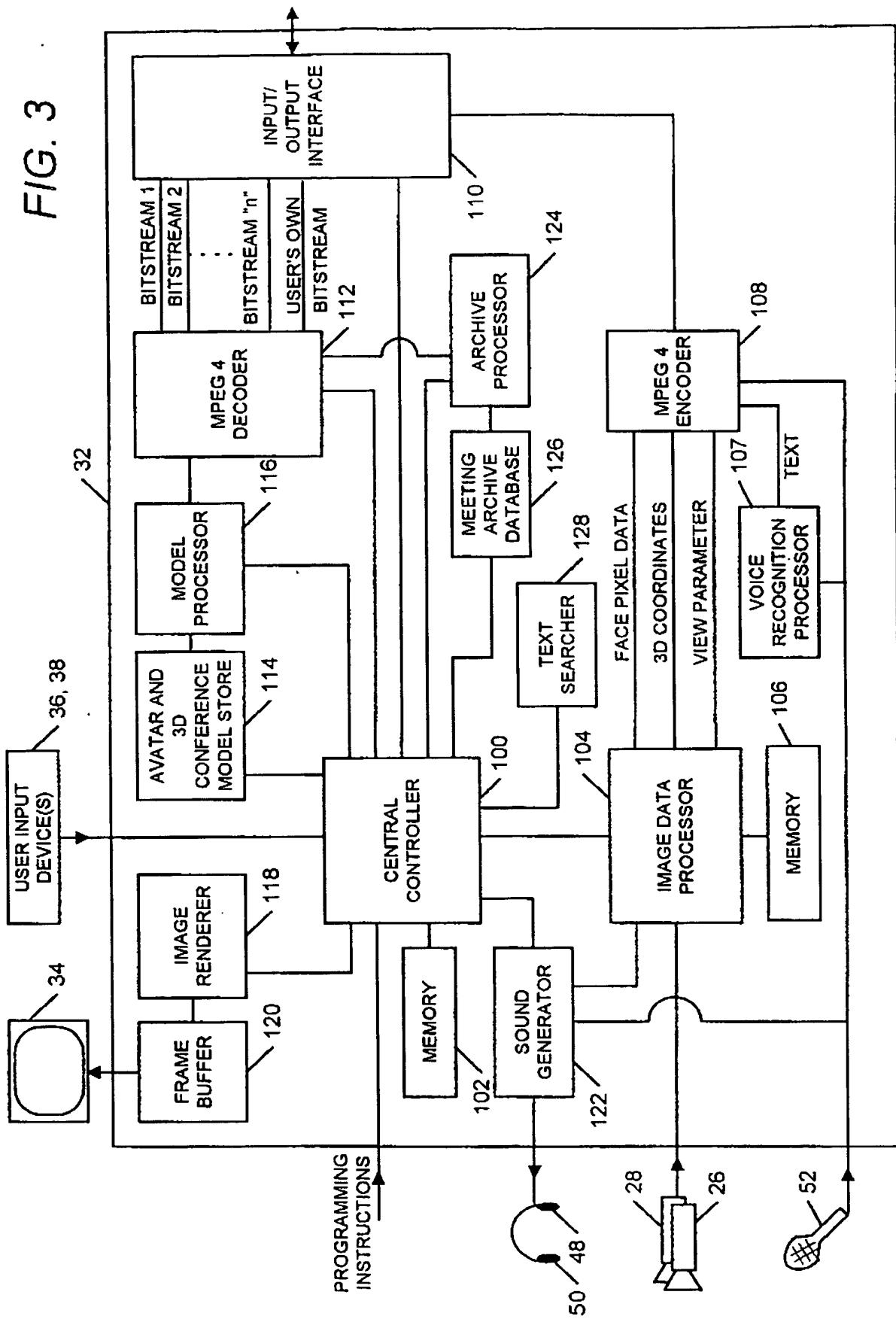


FIG. 3



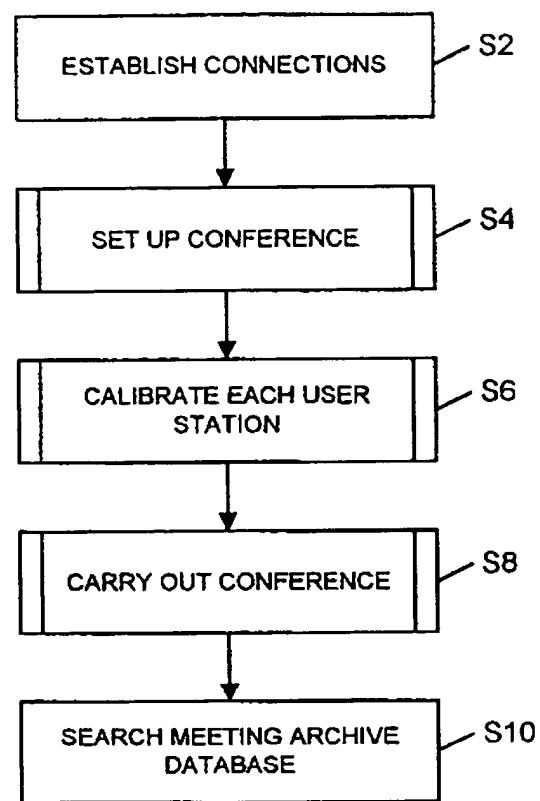


FIG. 4

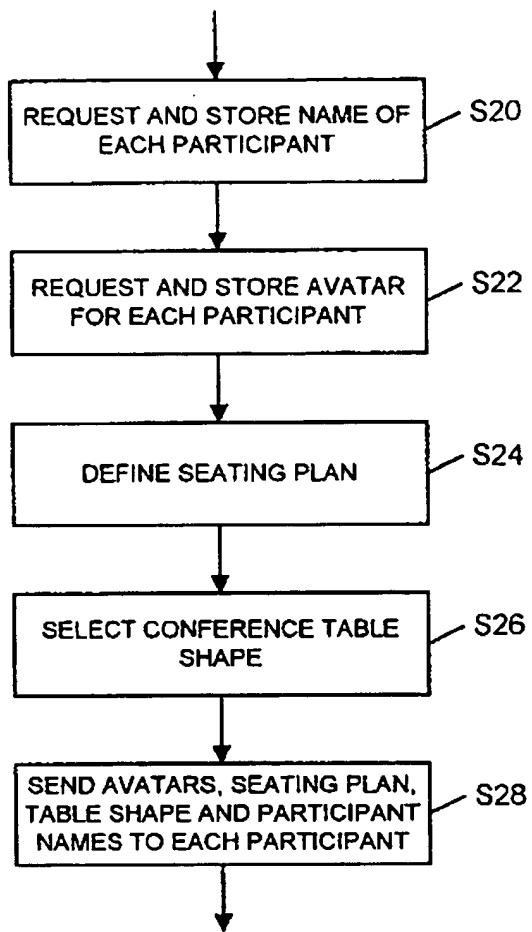


FIG. 5

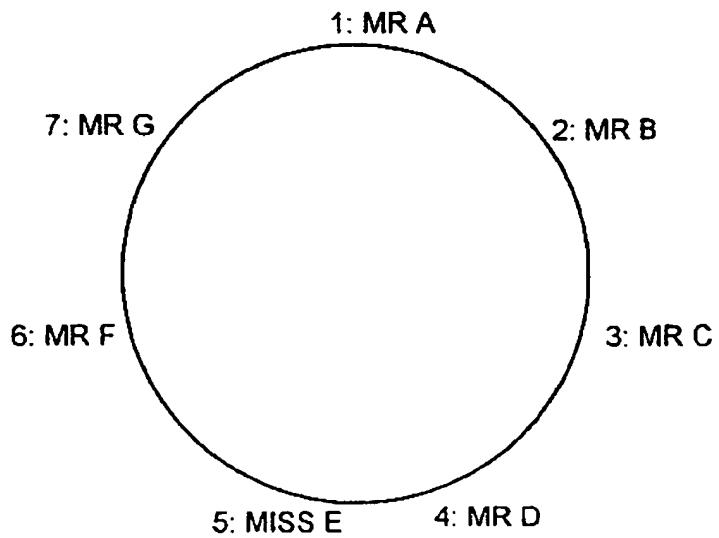


FIG. 6

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